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ADMA Products, Inc.
ADVANCE MATERIALS PRODUCTS, INC.

May 1, 2008

Mr. Roy King
Supervisory Patent Examiner
Art Unit 1742
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Ref: Application # 10/748,619, An Office communication letter from 3/24/08)

Dear Mr. King,

This letter is written in response to your Office Action Summary letter related to our Patent Application 10/748,619 "Fully-dense discontinuously-reinforced titanium matrix composites and method for manufacturing the same" which you sent to us on March 24, 2008.

We disagree with your decision and are asking you to reconsider our Application 10/748,619 to allow all fourteen claims in the final text of the patent. In particularly, we are protesting your decision to withdraw claims 5 – 14 from consideration. Our previous response dated October 25, 2007 related to your withdrawal of the claims 5-14 is well defined, we do not want to withdraw the claims 5 – 14 and explained our reasoning for this. We invented the new alloys which can be only produced by the newly invented manufacturing process. The microstructures and compositions of these new alloys presented in Figure 1 attached to this response are proving the fact that the prior art you are using as a reason for rejection may not be appropriate one as a base for your decision. Finally, we were very disappointed by the manner your Examiner, Mr. Weiping Zue was handling the processing this application and, in particularly, the manner he was discussing his reasoning for the constant delays in responding to us and his actions with the inventors. We make take a liberty to ask the appropriate officials to investigate this situation.

1890 Georgetown Road
Hudson, Ohio 44236
Telephone (330) 650-4000
Fax (330) 650-0030
www.admaproducts.com

Below please find the descriptions of our reasons for this request which are written in the same sequence as it was written in your Detailed Action letter:

1. The primary examiner divided Fourteen (14) Claims of our invention in two groups and you based this division as follows: Claims 1-4, drawn to a titanium matrix composite materials (I), classified in Class 75, subclass 252 and Claims 5-14, drawn to a method of manufacturing a titanium matrix composite materials (II), classified in class 419, subclass 14. We disagree with this division because our claims 5-14 are related to the sizes, material additions, forms of carbon additions, ratios, and other parameters to achieve the composition discloses in Claims 1-4 and to manufacture near full density invented composite material. Claims 5-14 comprise characteristics of chemical components, their ratios and heat treatments affected reaction between components that resulted in invented composition of the material which was disclosed in claims 1-5.

2. When we discussed this Application with Mr. Weiping Zue, the Primary Examiner on September 17, 2007, we agreed that Claims 1 - 4 as important novelty of the invention. The Primary Examiner advised that we can use Claims 5-14 in the Examples and may want to apply for a new patent application just for Claims 5-14. However, the Primary Examiner, Mr. Weiping Zue originally (September 27, 2007) and you, later (March 24, 2008) rejected both parts of the Application despite our mutual agreement to grant only Claims 1-4. We consider this action as non-ethical.

3. As we understood from our discussion with the Primary Examiner, he can grant the patent either for Claims 1-4 or Claims 5-14, and we both (Mr. Weiping Zue and myself) have chosen Claims 1 - 4 for the granted patent. We never intended to withdraw the Claims 5-14, and Mr. King does not have any reasons to remove these important claims. In two different conversations with Mr. Weiping Zue the inventors (Dr. Alexander Shapiro and Dr. V.S. Moxson) he offered to grant the patent for Claims 1-4, because the composition of our new material contains new components that are unknown from the primary art. Please see the Figure 1 showing the new composition which is impossible to produce by the prior art showing the complex carbide particulates and modified matrix material.

4. The Office Communication Letter stated that, "Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make by another and materially different process (MPEP §806.05(f). In the case of the titanium matrix composite materials as claimed can be made by another and material different process such as shock wave consolidation". We respectfully disagree with these statements. (1) We do not know any other material which can be manufactured by the claimed invention and you did not present, in your Detailed Action, an example of a product which can be made by a proposed invention related to the sizes, material additions, forms of carbon additions, ratios and other parameters to achieve the near full density product. All

invented parameters such as particle sizes of the various additions listed in Claims 5 - 14 are discovered just for the invented material. For instance, 0.01-5% addition of iron promotes sintering and densification and this addition is good just for the invented alloys. The other details we listed in Claims 5-14 discovered for the invented alloys and not applicable for the other materials like it is stated in Detailed Action. We also disagree with your statement, "(2) that the products as claimed can be made by another materially different process (MPEP §806.05(f). In the instant case the titanium matrix composite material as claimed can be made by another different process such as shock wave consolidation". In Claims 5-14, we are not claiming consolidation methods, we claim sizes, material additions, forms of carbon additions, ratios, sintering temperatures, etc. to achieve near full density.

5. Your Detailed Action indicates that, "During a telephone conversation with Mr. Vladimir S. Moxson on September 17, 2007 a provisional election was made without traverse to prosecute the invention of I, claims 1-4. Affirmation of this election must be made by applicant in replying to this Office action. Claims 5-14 are withdrawn from further consideration by examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention". Please accept this letter as a formal response that I, Vladimir S. Moxson (this is the correct spelling of my name) do not affirm this election and the authors of this invention will not withdraw the Claims 5-14 from further consideration. In fact, when we discuss this issue with you on September 17, 2007, I offered to withdraw the processing parameters, while continue to claim the sizes, material additions, forms of carbon additions, ratios, sintering temperatures, etc. to achieve near full density as it is described in Claims 5-14. This agreement was reached during our conversation on September 17, 2007, when you made me to believe that all our claims related to the alloys and sizes, material additions, forms of carbon additions, ratios, sintering temperatures, etc. to achieve near full density would be allowed.

6. Then, your Detailed Action references to Claim Rejections – 35 USC §103 and rejects Claims 1 – 4 based on Prior Art, US 5,722,037. We disagree that this Prior Art may be a reason for rejection of our invented material. Our application referenced to this patent US 5,722,037 in the very first example. In this example, we stated that this prior art is able to achieve only 93% density, i.e. require encapsulation for the further processing. The requirements to perform this processing by an expensive high temperature deformation clearly stipulated in the patent US 5,722,037. Our invention does not require this expensive operation, because the material produced against our invention is near full dense. Then you stated, in the paragraph 2.c, that complex carbides such as Ti_3AlC_2, Ti_2AlC, V_2C, and other are also be formed within the matrix according to the US Patent 5,772,037. It is incorrect statement because the authors of this patent referenced to X-ray spectrograms which demonstrated that only TiC precipitates are formed in their matrix and no other particles. Most important innovative feature of our invention is the fact that we prepared and introduced all complex carbide particles in the initial mixture of powders BEFORE SINTERING,

and this is a key point of our invention because only our approach can result to the manufacture of titanium matrix composites with controllable microstructure and high properties. Also we added a combination of particles (a) complex carbides and (b) borides, aluminides and even such intermetallics as $TiAlV_2$ or $TiCr_2$ (see claims 1, 4 and 7 of our Application). Additionally, we prepared and introduced in the blend particles of Al-V-Fe master alloy (see claim 5 of our Application) which plays a unique role in the manufacturing process as mentioned in the Detailed Description and Examples presented in our Application. The primary art Chung's patent does not contain a word about these particles. All above mentioned particles have different particle size allowing to control their solubility in the matrix alloy and final porosity, as well as provide effective reinforcement of the matrix. We disagree with your reasoning of ordinary skill in the art, and you did not bring any evidences regarding using or at least formation in the final products of the prior art such particles as $Ti_4Cr_3C_6$, $V_2Cr_4C_3$, Cr_3C_2, Al_4SiC_4, and all others which are presented in our claims 1, 4, 5, and 7. General statement that all such particles may be formed in the matrix alloy spontaneously during sintering is incorrect - such particles cannot be formed during sintering.

7. Your Detailed Action indicated that, "With respect to claim 2, Chung et al. ('037) disclose that the titanium composite is characterized by a density of 93% or higher of the theoretical density with closed pores and very low porosity (col. 5, lines 1-19 and col. 6, lines 8-19). The density of the titanium composite overlaps the claimed density. A prima facie case of obviousness is established. See MPEP 2144.05 I." This is incorrect statement. Prior Art is clearly indicates that there are closed pores which can be removed by hot consolidation. In both Examples referenced in the Prior Art the process clearly requires high temperature deformation to heal the closed voids. This is not the case with our invention which is well described in our Claims and Examples.

Based on the above listed reasons we are asking you to reconsider our Application 10/748,619 to allow all claims in the final text of the patent. If all fourteen claims are representing two independent inventions and your office cannot grant all these fourteen claims in one patent, please let us know and we will act accordingly.

If you have any question, please call me at (330)650-4000 from 10 am to 5 pm, or send e-mail moxson@admaproducts.com.

Sincerely yours,

Dr. Vladimir S. Moxson
Inventor

Fig.1 Microstructure of invented composite material with data from X-ray Diffraction Analysis
which confirms formation of new intermetallic particles and new matrix composition of our discontinuously reinforced titanium matrix composite. These particles and the matrix (disclosed in Claims 1-4) are formed using the process which is disclosed in Claims 5-14

Impulse/sec

No.		Cr	V	Al	Ti
1	Particle 1	300	6500	120-180	75000
2	Particle 2	1500	7500	200-250	73000
3	Matrix white	10500	14000	350-400	78000
4	Matrix gray	9000	15000	430-450	78000

Example #2 presented in original filing of the Application. A complex carbide-reinforced titanium composite material based on the Ti-6A1-4V alloy matrix was manufactured by (a) preparing a basic powder blend containing titanium powder having a particle size over 20 µm for 95% of the powder, 2% of graphite, 5% of dispersing TiC powder, and 2.5% of dispersing Cr_3C_2 particles partially soluble in the matrix at 1500-2300°F, (b) preparing a Al-V-Fe master alloy containing 2% of iron, (c) making a powder of Al-V-Fe master alloy having a particle size of 10 µm and less, (d) mixing the basic powder blend with the master alloy powder, in the ratio of 9:1 to obtain a chemical composition of titanium matrix composite material, (e) compacting the powder mixture at room temperature by die-pressing, (f) sintering at 2350°F, (g) forging at 1600°F, and (h) cooling.

Sintered semi-product had a density of 99% with closed discontinuous porosity that allowed carry out forging in open air without encapsulating (or encasing). The resulting carbide-reinforced Ti-6A1-4V matrix composite material has 100% density, and it exhibits improved yield strength at room temperature and at 930°F (500°C), and satisfied oxidation resistance up to 1470°F (800°C).